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Transparency and dealer behavior: The case of MiFID II and the bund market

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Konrad Lucke

Transparency and Dealer Behavior – The Case of MiFID II and the Bund Market

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TRANSPARENCY AND DEALER BEHAVIOR

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THE CASE OF MiFID II AND THE BUND MARKET

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April 23, 2026

Abstract

We study how the introduction of pre- and post-trade transparency requirements affected dealer behavior and market liquidity in the German sovereign bonds market. Using regulatory data on bond transactions collected under EU's Markets in Financial Instruments Regulation (MiFIR) and limit order book data from the Mercato Telematico dei Titoli di Stato (MTS) interdealer platform, we show that the reform had a positive effect on market liquidity, especially in the previously opaque market segments. However, it also led to a significant deterioration in market conditions in the MTS central limit order book. After dealers were required to publicly disclose quotes and trades to the rest of the market, bid-ask spreads widened and price discovery weakened. The evidence indicates that transparency reduced dealers' willingness to post competitive quotes in the limit order book, undermining the informational efficiency of this benchmark market. These findings highlight that greater transparency can discourage liquidity provision and weaken the mechanisms of price formation in interdealer markets.

Keywords: Sovereign bonds, market microstructure, market liquidity.

JEL classification: G14, G18, D47

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1 Introduction

The effect of transparency on market quality has for a long time been the object of academic and regulatory debate. At the core of it lies the question whether policy makers can improve market conditions by mandating that market participants have to make public the bid and ask prices at which they are willing to trade and the realized prices and quantities of executed trades. There are two opposing views on this policy. In favor of increased transparency is the argument that it will lower information asymmetries and enhance price discovery by providing the entire market with real-time information on the current fair price. Opponents argue that instead transparency can harm market quality by altering the behavior of market makers and informed investors. These might be worried about revealing too much information under a transparency regime and therefore trade less. Market makers also have less of an incentive to provide liquidity or collect information on fundamental values if they are not able to profit from it. This would result in a reduction of liquidity and a slower price discovery process.

Which of the above channels dominates the effect of transparency on market quality remains theoretically and empirically unclear and likely depends on the precise institutional setting and the implementation of the transparency regime. Results might vary according to the instrument in question, i.e., between equities, options, sovereign bonds, or corporate bonds. Similarly the existing market structure will be a key factor in determining the effect of transparency. Some venues already provide a high degree of transparency. Others remain popular precisely because they do not. Any venue cannot be seen in isolation but as a substitute to the other venues and attention should be paid to the role of transparency in the competition between venues.

The immense complexity of modern financial markets makes predictions of the effect of transparency on market conditions highly uncertain. Nonetheless, policy makers have often pursued a course in favor of transparency regimes. For example, in 2002 the US introduced the Trade Reporting and Compliance Engine (TRACE) which mandates the reporting and public dissemination of corporate bond transactions. The EU passed the first Markets in Financial Instruments Directive (MiFID I) in 2004 and put it into effect three years later. This directive obliged market participants to report on equity transactions. Then in 2014, the EU followed up with an even more extensive reform containing the revised Markets in Financial Instruments Directive II (MiFID II) and its accompanying regulation MiFIR. Implemented in January 2018, the regulation fundamentally reshaped how trading activity in European financial markets is organized, observed, and reported. Its scope extends well beyond equities to cover bonds, derivatives, and structured products, thereby bringing market segments that had long operated in relative opacity in the EU — most notably fixed income — under an unprecedented transparency regime.

The introduction of transparency is especially relevant for the bond market as this market has traditionally been characterized by a high degree of opacity. A large amount of trading in this market takes place over the counter or via interdealer-brokers (see [de Roure, Moench,](#)

Pelizzon, and Schneider (2025)) and while the years prior to MiFIR had seen a rise in electronic trading, as described for the US by O’Hara and Zhou (2021), electronic trading of bonds has remained at very low levels compared to that of other instruments. At the same time, correct functioning of the bond market is very important for the financial system and the economy as a whole. The EU’s Capital Markets Union policy agenda in the late 2010s and now its Savings and Investment Union are clearly aimed at further leveraging the financial system to finance investment and a well-functioning bond market is essential for accomplishing this. Sovereign bonds have experienced numerous episodes of stress in recent years, including the so called dash-for-cash in the early days of the COVID crisis, the 2022 UK gilt crisis, and 2025’s rise in US treasury yields on Liberation day. These episodes have highlighted the need for resilience in sovereign bond markets and the importance of considering the effect on dealers’ market-making activity of any financial market reform.

Given the importance of this topic, this paper studies how the transparency requirements introduced by MiFIR affected liquidity provision and price discovery in the German sovereign bond market. Focusing on German Bunds, we examine both pre-trade transparency—through the mandatory publication of quotes—and post-trade transparency—through public transaction reporting. The Bund market offers an ideal laboratory. It is among the largest and most liquid sovereign bond markets globally, features a rich mix of trading protocols, and has long relied on the Mercato Telematico dei Titoli di Stato (MTS) interdealer limit order book as a central venue for price discovery.

We show that the effect of MiFIR on the German Bund market was twofold. First, transparency requirements led to a relative improvement in liquidity for bilateral OTC trades. These, being the most opaque, were most strongly impacted by the regulatory reform. Using a difference-in-differences framework, we compare these trades to trades occurring on request-for-quote (RFQ) platforms (i.e., multilateral trading facilities (MTF) or organized trading facilities (OTF)), and we find that the gap in liquidity lessened to the benefit of OTC trades. Second, the introduction of public quote and trade disclosure weakened liquidity provision and price discovery on the MTS interdealer central limit order book (CLOB). After January 2018, when dealers were required to make their quotes and trades public bid–ask spreads widened and the informational content of MTS quotes declined. These changes mark a structural shift in the role of MTS. Before MiFIR, the platform served as a central venue for interdealer trading and a benchmark source of prices for the broader Bund market. After the reform, quoting became less competitive and the MTS order book lost much of its price discovery function. Taken together, the two effects point to mixed overall success of the reform. More opaque venues benefited at the expense of the most liquid venue.

Our analysis combines two main data sources covering the two years before and after the implementation of MiFIR. First, we use transactions data collected by the German Federal Financial Supervisory Authority (Bundesanstalt für Finanzdienstleistungsaufsicht, popularly known as BaFin) under MiFIR and its predecessor the Wertpapierhandelsgesetz (WpHG). This

data set contains all trades involving a financial firm regulated in Germany. Second, we use limit order book data from MTS. Together, these data sources provide a comprehensive overview of the Bund market. We make use of the fragmented market structure to study whether different venues were impacted differently depending on their functioning, their participants, and their degree of transparency prior to MiFIR.

We focus on the MTS trade venue because our findings indicate it was directly affected by the reform's transparency requirements but most likely unintentionally. Before MiFIR, quotes and trades on MTS were visible only to participating dealers. The reform introduced a regime in which bid and ask quotes and prices of executed trades had to be made public, subject to only limited deferral. This change exposed dealers' trading intentions and execution prices to a broader market audience, including buy-side participants and competitors active on other trading venues. We study how dealers adapted their quoting behavior once knowledge of their activity was no longer confined to the closed circle of MTS members. The evidence shows that dealers responded to transparency by scaling back the aggressiveness of their quotes. Posted spreads became less tight, which we interpret as evidence that dealers became more reluctant to reveal their trading interest in the open order book. These behavioral adjustments likely reduced the informativeness of displayed quotes and impaired the process of price discovery. In the years following the reform, the relationship between quotes on MTS and subsequent transaction prices weakened.

The mechanism behind this deterioration is straightforward. Public disclosure increases the informational cost of quoting in dealer markets. When other market participants can observe a dealer's quotes and recent trades, they can extract information on the price of the instrument. This makes dealers more vulnerable to adverse selection and limits their willingness to provide liquidity. In the interdealer environment, where market-making incentives rely on reciprocity and information sharing among members, the shift to public transparency undermines those informal arrangements. MiFIR therefore changed the strategic environment of the MTS market: what had been a semi-private forum for price discovery among dealers became a quasi-public display of quotes with asymmetric informational consequences.

This highlights a largely overlooked effect in the debate on how mandated transparency affects market quality. While transparency achieved its intended purpose of enhancing liquidity on client-facing trading venues, our results also show that in interdealer trading venues it had the opposite effect. The Bund market illustrates that when liquidity provision depends on the willingness of dealers to post quotes under limited informational exposure, mandatory disclosure can discourage market-making and erode efficient market functioning. The reform shifted the balance between transparency and liquidity in a way that reduced the effectiveness of the limit order book as a mechanism for price formation. This mechanism is distinct from those previously documented, for example by [Bloomfield and O'Hara \(1999\)](#) and [Madhavan, Porter, and Weaver \(2005\)](#). These papers focus on dealer competition for order flow or adverse selection

costs. However, the fact that we observe a negative impact of transparency in an interdealer venue excludes either as the single plausible explanation. Instead, we argue that the main channel for the decline in liquidity on MTS is the fear of revealing too much information to the broader market. Another explanation for the decrease in market quality on the central limit order book is that greater transparency made other venues more attractive, causing liquidity to migrate to these. Although we cannot entirely rule out this possibility, the absence of a large change in the transaction volume on MTS suggests that it is unlikely to be the main mechanism.

This paper also adds to the overall evidence on the consequences of mandatory transparency regimes in fixed income markets. Previous studies, often focusing on post-trade disclosure of transactions, have documented mixed effects (see [Edwards, Harris, and Piwowar \(2007\)](#), [Bessembinder, Maxwell, and Venkataraman \(2006\)](#), or [Goldstein, Hotchkiss, and Sirri \(2007\)](#)). We extend this literature by examining both quote and trade transparency in a setting where interdealer quoting is central to market functioning. In the German Bund market, one of the largest and most liquid sovereign bond markets in the euro area, the interdealer segment has long served as a price reference for European fixed income markets. By isolating the impact of MiFIR on this benchmark market, we provide direct evidence on how transparency reshapes dealer incentives and the structure of liquidity provision.

The primary precedent for a transparency regime change in bond markets, is the introduction of the Trade Reporting and Compliance Engine (TRACE) for U.S. corporate bonds. These securities were and still are largely characterized by bilateral OTC trading. The overall positive experience with the TRACE framework (as documented for example by [Edwards et al. \(2007\)](#), [Bessembinder et al. \(2006\)](#), and [Goldstein et al. \(2007\)](#)) was a motivating factor for the adoption of a similar regime in EU in the form of MiFID II. However, it is important to realize that due to differences in market structure and trading frequency and volume, the conclusions drawn from TRACE do not necessarily carry over to European bond markets. Also MiFID II differs in several crucial ways from TRACE, which at its introduction only covered corporate bonds, while MiFID II also includes sovereign bonds. The two markets differ significantly in terms of trading frequency, volume, and liquidity. They also differ in terms of their structure. While corporate bonds are mostly traded OTC via dealers, sovereign bonds can also be traded on centralized limit order books. Given the central role of sovereign bonds in the financial system, it is crucial that this market continues to function smoothly.

Another difference between TRACE and MiFIR is the centralization of trade reporting. While under TRACE all reports were made public in the same location, MiFIR initially allowed for individual publication arrangements leading to a high degree of fragmentation in reporting venues and formats. This dramatically impacts the usability of the reported data and potentially the achieved effect on market liquidity. These differences between the two transparency regimes imply that each has to be studied separately in order to draw appropriate conclusions on their effects.

The EU started working on revisions of the MiFID II framework in 2021. On March 28, 2024 several of these have taken effect and are now being implemented. These revisions intend to address shortcomings of the previous framework. As mentioned above, MiFIR initially did not require centralized reporting, leading to a lack of usability. Especially in a market as fragmented as the bond market, the reported information was difficult to collect and utilize for more informed trading decisions. The EU therefore decided to introduce a consolidated tape (CT) where all trades would be published in one centralized location, much more easily accessible, especially for unsophisticated market participants. A second change enacted in 2024, is the exemption of request-for-quote (RFQ) platforms for bonds from pre-trade transparency requirements. These now only apply to order-book trading systems. While it is encouraging that the EU considers feedback from market participants and revises its regulations accordingly, the effects of those regulations should be carefully studied before any changes are made. As we show in this paper, transparency requirements can have important consequences on market structure, liquidity, and price discovery. It is thus paramount to understand exactly the impact of the initial reform to design sound policy going forward.

2 Literature

To the best of our knowledge, this is the first paper to examine the impact of transparency requirements under MiFID II on the sovereign bond market. Many papers have studied previous transparency regimes, most notably the introduction of TRACE in the US corporate bond market. [Bessembinder et al. \(2006\)](#) shows that when regulators required dealers to report trades publicly in 2002, transaction costs for institutional investors fell by 5 to 8 basis points. The paper also finds evidence that the bond market became more competitive after the introduction of TRACE. [Edwards et al. \(2007\)](#) show that bonds newly subject to TRACE reporting saw a clear drop in bid-ask spreads compared to similar bonds that remained opaque. [Goldstein et al. \(2007\)](#) used a randomized experiment involving BBB-rated bonds and similar conclusions: transparency has either a neutral or positive effect on liquidity. These studies also show that transparency reshaped market structure. The dominance of a few large dealers declined after TRACE, and smaller dealers gained market share. Investors benefited from more competition and better price information. Even bonds that were not yet TRACE-eligible experienced spillover benefits, suggesting that the presence of a more informative market environment improved outcomes across the board.

We differ from these papers by looking at sovereign bonds which have much higher trading volume and liquidity. We also study a market that is much more heterogeneous in terms of trading protocols than was the case for the US corporate bond market in the early 2000s. A particular feature of the sovereign bond market is the existence of a central limit order book where the effects of transparency regimes can be dramatically different than in OTC markets.

Previous studies of transparency requirements on limit order books have focused on equities and on transparency regimes imposed by the trading venue. Their findings differ. While [Madhavan et al. \(2005\)](#) and [Simaan, Weaver, and Whitcomb \(2003\)](#) find that transparency is harmful to liquidity due to a reduced willingness of market makers to provide liquidity, others such as [Eom, Ok, and Park \(2007\)](#), [Boehmer, Saar, and Yu \(2005\)](#), or [Hendershott and Jones \(2005\)](#) find a positive effect mainly thanks to increased informational efficiency. In contrast to these papers, we study the limit order book for sovereign bonds that already provided full transparency to its members but was then obliged to extend this transparency to the entire market.

Beyond transparency regimes, our paper relates to the literature on OTC markets and the determinants of transaction costs. Papers such as [Duffie, Gârleanu, and Pedersen \(2005\)](#), [Duffie, Gârleanu, and Pedersen \(2007\)](#), [Üslü \(2019\)](#), or [Hugonnier, Lester, and Weill \(2022\)](#) point to search and bargaining frictions as determinants of bid-ask spreads. They find that bid-ask spreads are lower when investors have access to more market makers, a process facilitated by transparency. These models suggest that transparency is particularly helpful in OTC markets such as most bond markets. Studying the US corporate bond market, [Friewald and Nagler \(2019\)](#) empirically confirms the importance of search and bargaining frictions. They find that these are more important compared to inventory costs. However, this view is disputed by [Feldhütter and Poulsen \(2018\)](#) who instead find inventory costs to be more relevant. The importance of dealer inventory constraints on market liquidity is analyzed by a number of papers such as [Bessembinder, Jacobsen, Maxwell, and Venkataraman \(2018\)](#), [Goldstein and Hotchkiss \(2020\)](#), or [Goldberg and Nozawa \(2021\)](#).

A third group of papers looks to information frictions as a key driver of transaction costs. One example is [Pintér, Wang, and Zou \(2022\)](#) which emphasizes the importance of dealers collecting information through trades with their clients. Another is [Garrat, Lee, Martin, and Townsend \(2025\)](#) which explicitly looks at the effect of post-trade transparency in interdealer markets finding an increased willingness of dealers to provide liquidity to one another. Furthermore, papers such as [Glode and Opp \(2019\)](#) and [Lee and Wang \(2025\)](#) study the importance of information in choosing to trade over-the-counter or on a trading venue. Similarly, [de Roure et al. \(2025\)](#) looks at the choice of dealers between three different trading protocols for interdealer trades: bilateral OTC, interdealer broker, and limit-order-book. For this they also look at the market for German sovereign bonds. They find that transaction costs and protocol choice are most in line with theories of OTC that focus on information frictions. This implies that transparency is likely to be important in this market as it changes the access to information of market participants.

Looking at the US corporate bond market, [O'Hara and Zhou \(2021\)](#) document the rise of RFQ systems like MarketAxess. They find that this reduces transaction costs especially for smaller retail trades but that dealers are reluctant to trade information-sensitive bonds on electronic platforms. Therefore the market power of dealers hinders the transition to a more

centralized market. This finding that is confirmed by [Allen and Wittwer \(2023\)](#) studying the welfare effects of centralization in the Canadian sovereign bond market. Our paper relates to this by documenting a regulatory-induced increase in the share of RFQ trading in the Bund market but also a decrease in the market quality of the centralized limit order book.

3 Data

We use two main data sources to study the impact of MiFIR on the German Bund market: (i) limit order book data from the MTS interdealer platform, and (ii) regulatory transaction data collected by BaFin under MiFIR and its predecessor, the WpHG.

3.1 MTS Limit Order Book

The MTS Group provides the largest interdealer market for Euro-denominated bonds. It operates several limit order books where dealers post executable bid and ask quotes for standardized trade sizes. Bunds are traded on the German “domestic market” (GMTS) as well as on the “European market” (EBM). Both are highly liquid and for the most part quoted prices between the two venues correspond exactly. MTS provides the possibility for dealers to quote in both markets simultaneously for participants registered in both markets. As one would expect, apart from minuscule intraday fluctuations, the prices quoted on both markets correspond exactly. The MTS limit order book provides ample depth, often exceeding 100 million Euro on both sides of the market. MTS imposes a minimum trade size of 2.5 million Euro and a maximum of 10 million Euro. The platform plays a central role in the Bund market. Continuously available quotes mean that it can serve as the reference venue for interdealer trading and provide benchmark prices used across other market segments.

Trading on MTS is restricted to its members, which are the main dealers for the market, including the primary dealers. For the Bund market there are around 40 different members across our sample period. Any trading activity taking place on MTS is visible to all members. While members do not see who sends a quote or a market order, they see all the limit orders in the book and the transactions taking place. Thus, MTS provides (and did so also before MiFIR) complete pre- and post trade transparency to its members. A certain subset of information such as prices and volumes is and was already disseminated to the entire market before MiFIR via subscription services such as Bloomberg.

Our dataset contains the full record of limit order submissions, modifications, cancellations, and executions for all German Bund securities traded on MTS. For each order, we observe the timestamp, bond identifier (ISIN), side (buy or sell), price, and quantity. The data allow us to reconstruct the full order book at any point in time, so that we can measure bid–ask spreads and the intensity of quoting activity at high frequency. We construct two main variables for our

analysis: The mid price and the best bid-ask spread. We do this by sampling both limit-order books on which Bunds are traded at 5 minute intervals. At each sampling point, we take the best bid- and ask quotes across both limit order books. Their midpoint provides the mid price while their difference is the bid-ask spread. From these two variables we can see the volatility as well as the prevailing liquidity in each instrument and in the overall market.

3.2 Regulatory Transaction Data

The second dataset consists of regulatory transaction reports collected by the BaFin. These data were first gathered under the WpHG and, from January 2018 onward, under MiFIR. The reporting obligations cover all transactions by investment firms regulated in Germany, in financial instruments admitted to trading on EU venues, including over-the-counter trades. Dealers and other investment firms are required to submit detailed information on each executed transaction, irrespective of where the trade occurred.

The BaFin data provide comprehensive coverage of secondary market activity in German sovereign bonds. The trade reports are confidential regulatory submissions and each record includes the trade date and time, instrument identifier, price, volume, venue, and counterparty identifiers. Compared with the MTS order book, which captures only displayed interdealer quotes and trades, the BaFin data include a large share of all executed transactions in Bund securities. It offers a comprehensive view of market activity including dealer-to-client trades, interdealer trades, and in rarer cases trades not involving a dealer at all. The regulatory dataset collected by BaFin differs from the data published by the investment firms themselves. Most importantly the publicly available data does not contain information on the entities involved in the transaction. However, this information is reported to BaFin and our data contains a pseudonymized version of these identifiers. This allows us to track entities over time but does not permit any conclusions as to the true identity of a firm. Furthermore, investment firms also have the option to defer publicly reporting very large trades that exceed a volume of 25 million.

To clean this data we mainly follow approaches by [Gündüz, Ottonello, Pelizzon, Schneider, and Subrahmanyam \(2023\)](#) and [Kerssenfischer, Lucke, and Scherrieble \(2026\)](#). We filter out trades occurring outside of regular trading hours, as well as trades occurring before the bond was issued or after it has reached its maturity. We also remove transactions with a reported volume larger than the total amount issued. An issue with the data is that prices are reported in various formats and there are frequent misreports with completely unrealistic prices or quantities. To ensure reliable price information, we convert the prices to implied yields. We then estimate an hourly yield curve using a Nelson-Siegel-Svensson model and compare the fitted yields to the price-implied yields. We remove trades with prices that deviate by a percentage point or more from their fitted price. Finally, we drop duplicated transactions that arise when both sides of a trade are under the obligation to report.

To be able to get a complete picture of the market at any point in time, we merge our two datasets, the MTS limit order book and the MiFIR transaction reports. This means that for any given transaction we find the closest previous best bid and ask prices for that bond on MTS within a 5-minute window. This gives us a precise reference price and counterfactual of what execution costs for the trade would have been on a centralized exchange. Furthermore, it allows us to infer who is the initiator of the trade, i.e., who provides liquidity and pays the half spread. This method of combining these two datasets, previously also used by [de Roure et al. \(2025\)](#) for the pre-MiFID II period, provides powerful insights into liquidity conditions in the Bund market.

4 Sample Selection and Descriptive Statistics

We filter the MiFIR data for German sovereign bonds using issuance data from the German Finance Agency (Finanzagentur). These data also provides us with further bond level information, such as, the amount issued, the issuance date and the maturity date. We restrict our sample of bonds to include only plain vanilla bonds with an original maturity of at least 2 years. Following [Bessembinder et al. \(2018\)](#), we also drop rarely traded bonds with less than 5 trades over the entire sample period. The final number of bonds in our data is 102.

We focus on the period from January 1, 2016 to December 31, 2019, spanning two years before and two years after the implementation of MiFID II in January 2018. This gives us enough time in both the pre- and post-MiFID II sample, to observe the liquidity conditions in the market and then how they changed in January 2018. It is important to look at a relatively long time period around the adoption of the reform as many effects may have taken time to develop, or on the contrary, might have happened immediately but then reversed as market participants adapted to the new setting.

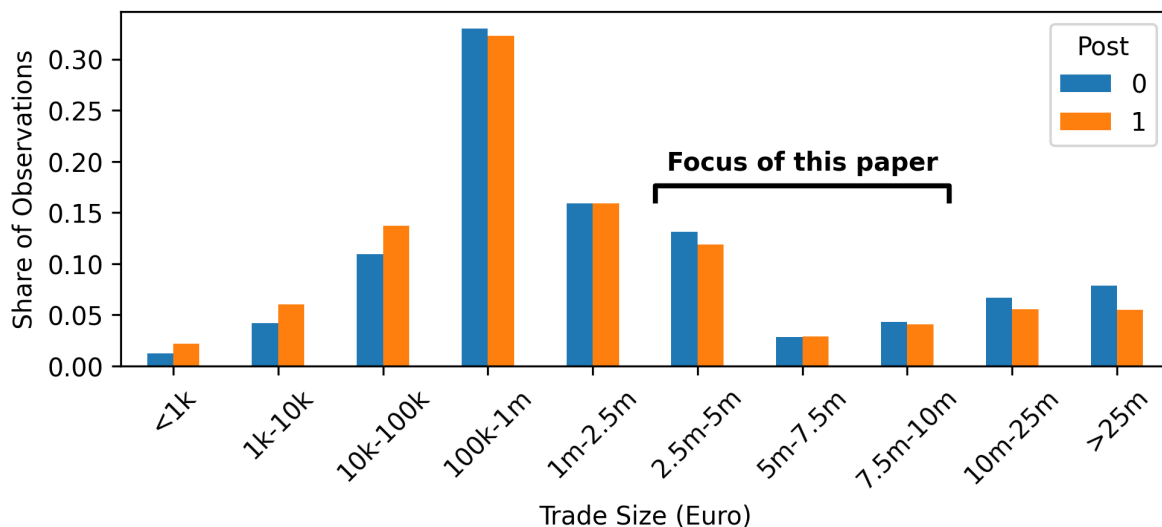


Figure 1: Distribution of trade sizes for sample periods before and after MiFID II. This paper focuses on trades with a size between 2.5 million and 10 million Euro as these are the restrictions on trade sizes on the MTS limit order book. The trade size distribution is shown separately for the pre- (blue) and post-MiFID II period (orange).

Our primary analysis focuses on large institutional trades with a volume of 2.5 - 10 million Euro as these are the restrictions on trade sizes imposed by MTS. Thus any of the trades we analyze could have taken place on MTS. Figure 1 shows the distribution of trade sizes across the whole market before and after MiFID II. One can see that they remain relatively stable. MiFIR allows investment firms to delay the reporting of very large trades (more than 25 million Euro). One concern was that this could lead to investment firms trying to fall above this threshold to be allowed to defer their reporting. However, this does not seem to be the case as the share of trades with a volume larger than 25 million Euro decreased after MiFID II.

The differing reporting obligations and duplicate reporting make it difficult to obtain accurate estimates of the overall trade volume, however, we can observe trends over time. Figure 2 shows the trade volume of Bunds in our final sample of transactions reported under MiFIR as well as the MTS trade volume in the same bonds. The two time series tend to be strongly positively correlated. MTS represents around 5-10% of the trade volume in this market segment (large, institutional trades). Aggregate volumes from before and after MiFID II are not entirely comparable as they are reported under different regulations with different reporting requirements. While under MiFID I predominantly sell-side firms reported, under MiFID II also the buy-side has to report. This leads to a different degree of duplication in the two parts of our sample. While we try to address this by removing duplicates, it should be considered that changes in volumes before and after may be driven by the way the data is reported.

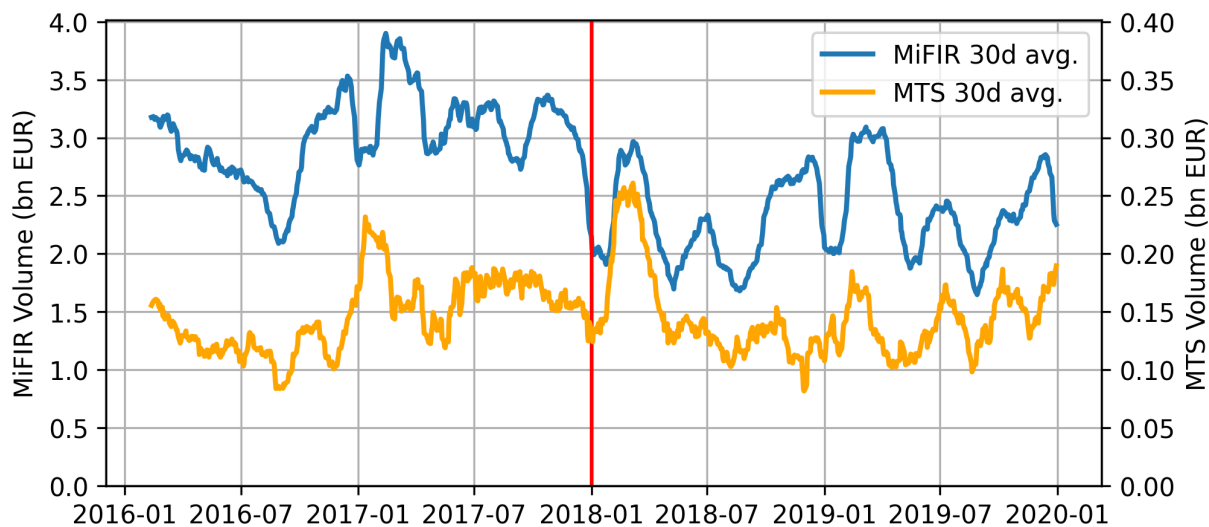


Figure 2: Trade volume reported under WpHG and MiFIR (blue, left-hand side scale) and MTS filled orders (yellow, right hand side scale). The red line marks the introduction date of MiFID II on January 1, 2018.

5 Market Structure

The Bund market is strongly fragmented in various ways. First, as documented by [Kerssenfischer et al. \(2026\)](#), trading is highly concentrated in deliverable Bunds, i.e., in bonds with a remaining maturity of around 10, 5 or 2 years. In our dataset, transactions in these bonds make up more than 20% of the total trade volume.

Secondly, the Bund market is fragmented across trade venues. There are in total 165 venues reported in our dataset. While the larger venues such as the Bloomberg Multilateral Trading Facility and Tradeweb capture a large portion of the trades, a non-negligible amount is scattered across a high number of very small venues. Additionally, around 45% of trades do not take place on any venue but are pure bilateral OTC trades. Furthermore, there is the option of transacting via broker or trading on the MTS central limit order book. Choosing between these venues has important implication in terms of search and bargaining costs and the amount of information that is revealed. These considerations ultimately also impact the execution costs on each venue, as observed by [de Roure et al. \(2025\)](#).

[de Roure et al. \(2025\)](#) analyzes in detail the venue choice of market participants in the years preceding the introduction of MiFID II between trading on MTS, entering a bilateral OTC trade, and trading via an interdealer broker (IDB). Instead of the latter we focus on the use of RFQ platforms, electronic trading venues where investment firms can buy or sell financial instruments. They facilitate the search for a counterparty by providing a degree of centralization in the market.

While some trade venues, such as typically RFQ platforms, are accessible to all market participants, others are reserved for dealers only (for example MTS and IDBs). This introduces another form of fragmentation into the market. In our dataset around 26% of trades are interdealer (D2D) trades, 62% are dealer-to-client (D2C) trades and the remaining 12% are in between clients.

By changing fundamental characteristics of trade venues in terms of the visibility of trades, MiFID II had a profound impact on the market structure. This concerns the usage of individual trade venues, the process by which certain trades select into a venue type, as well as overall liquidity conditions. One of the goals of MiFID II was to reduce the quantity of OTC trades and instead push these trades on more regulated venues. Figure 3 shows how the share of trade volume on each venue type evolved over time. It reveals a stark change at the introduction of MiFID II. Some of this is driven by differing classifications under MiFID II, i.e., Systemic Internaliser trades would have simply been considered as OTC trades before MiFID II. Yet even accounting for those, it is clear from Figure 3 that the trade volume on MTFs and OTFs increased at the expense of OTC trades. In this aspect MiFID II achieved its goal.

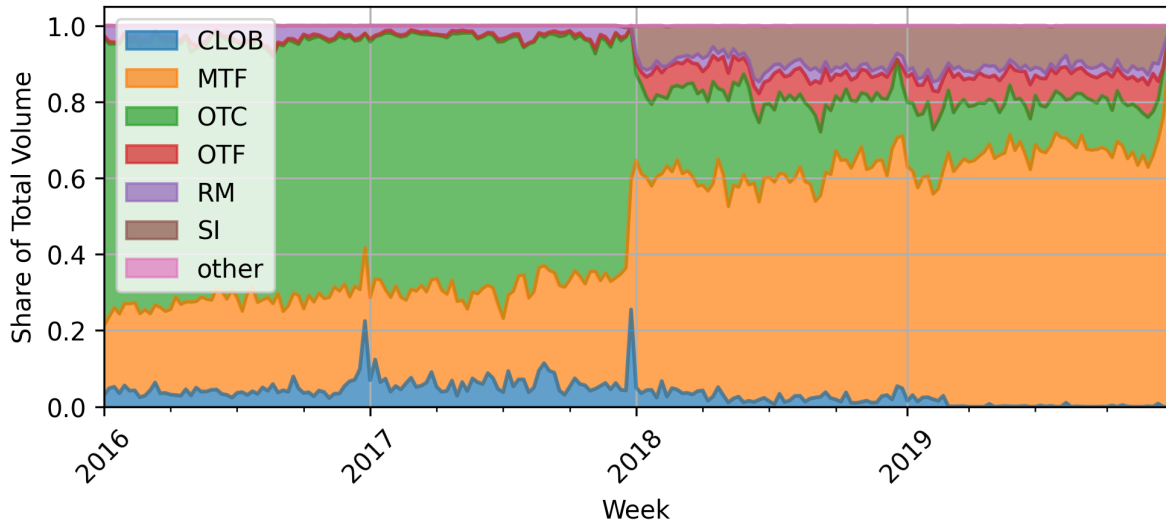


Figure 3: Weekly share of total trade volume in German sovereign bonds per venue category. CLOB represents the MTS centralized limit order book. MTF (multilateral trading facility), OTF (organized trading facility) and RM (regulated market) trades are typically RFQ trades. SI (systemic internaliser) trades and trades occurring outside of any registered venue are considered as bilateral OTC trades. OTFs and SIs were created as venue categorizations under the MiFID II framework. A small percentage is not attributable to any venue category and remains classified as “other”.

MiFID II also brought about a change in the volume captured by individual venues. Many new venues became active in January 2018 while some previously existent ones were shut down. Also among those that continued to function many experienced a change in trading activity, as illustrated by Figure 4. Around half of the venues are exclusively used by dealers to intermediate trades to clients. D2D trades either take place OTC or are relatively concentrated on a few

venues, namely the Bloomberg MTF, Tradeweb and MTS.

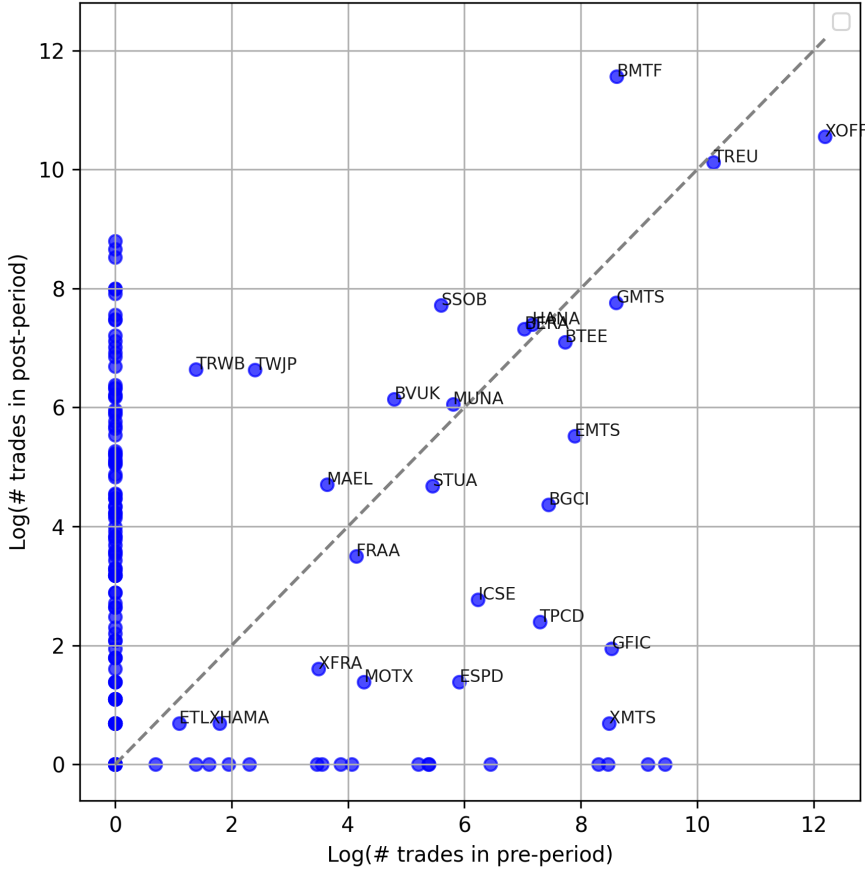


Figure 4: Pre- and post-MiFID II log number of trades per trade venue. Venues marked in red are used for interdealer trades. Venues in blue are used exclusively for D2C or client-to-client trades. Venues situated on either axis did not exist in either the pre- or post-period. Venues operating in both periods are labeled by their market identifier code (MIC). The largest venues in terms of the number of trades in both periods are the RFQ platforms Bloomberg Multilateral Trading Facility (BMTF) and Trade Web Europe (TREU). Trades occurring outside and venue are categorized and labeled with ‘XOFF’.

We recognize that the choice of trading venue is highly endogenous to the prevalent liquidity conditions. Market participants will choose the cheapest venue for the execution of a trade, considering also indirect costs such as the revelation of information or search costs. Which venue is the cheapest may also depend on the characteristics of the transaction a market participant is trying to execute. For example, the size of the trade, the time to maturity of the transacted instrument or its on-the-run (OTR) or cheapest-to-deliver (CTD) status can matter for the venue choice. In the following, we provide statistics on trade characteristics per venue and investigate the factors that determine the venue choice. We focus in particular on the choice between bilateral OTC and RFQ trading. MiFID II led to an important change in the market. We first describe the conditions in the two years preceding MiFID II (pre-period) and then investigate how conditions changed in the two years after January 1, 2018 (post-period). For an in-depth analysis of the market structure after MiFID II see [Kerssenfischer et al. \(2026\)](#).

Around two thirds of D2C trades in the pre-period happen as bilateral OTC trades. This compares to 73% for D2D trades, indicating a certain preference for bilateral OTC trading among dealers. 15% of all D2D trades are on an RFQ platform and 12% are on MTS. In spite of a certain preference for OTC trading, dealers also frequently use RFQ platforms to transact with other dealers.

Trade sizes also vary across both venue types. In the pre-period of our overall sample (before restricting trade sizes to the subset of those eligible to be traded on MTS) the median trade sizes are 0.7 and 1.5 million euros for RFQ and OTC trades, respectively. The average trade sizes differ even more with 3.8 million for RFQ trades and 9.7 million for OTC trades. However, the latter is heavily skewed by few very large transactions that typically happen over-the-counter. More than 85% of all transactions with a volume above 25 million euros happen OTC. Among the trades with volumes that can be transacted on MTS, the average and median trade sizes of RFQ and bilateral OTC trades converge and are all at around 5 million euros. On-the-run and cheapest-to-deliver bonds are both slightly more frequently traded in bilateral OTC trades than other bonds. As describe above, especially the former make up a very large portion of the overall trading volume. Both are traded very frequently. Around 20% of all trades are in OTR bonds, even though at any given point in time there are at most three bonds that are on-the-run. Similarly, 11% of all trades are in CTD bonds. The fact that both are traded more frequently OTC than on RFQ platforms could be explained by them being in relatively high demand making it easy to find a buyer or seller, resulting in low costs.

Whether due to the characteristics of the trade venue, i.e., prevalent search and bargaining costs or adverse selection, or due to selection of bonds or types of trades, the RFQ and bilateral OTC trades differ in their average liquidity. In the pre period, the average volume weighted price dispersion is 7.7 bps for bilateral OTC trades and 6.5 bps for RFQ trades, making bilateral OTC significantly less liquid. This result holds for D2D and D2C trades. Since frequently traded OTR and CTD bonds tend to be traded OTC, this result is surprising and indicates that the differences in liquidity are not driven by the selection of instruments into a specific venue.

To more formally determine what determines the venue where a trade takes place, we regress a dummy for OTC on several trade characteristics. These are the logarithm of the time to maturity, the OTR and CTD status, whether it is a D2D or D2C trade, and the logarithm of the trade size. We interact each of the coefficients with a dummy variable equal to one if the trade occurs after January 3, 2018. Table 1 shows the results for a linear probability and a probit model. One can see that apart from the Post-dummy only the coefficient on the D2D dummy and its interaction with the post-dummy are highly significant. The fact that the other interaction terms are only slightly or not at all significant suggest that there was not a major change in the types of trades that took place over the counter along bond characteristics. Instead the identities of the trading entities appears to be of much higher relevance.

	(1)	(2)
	LPM	Probit
Days since issuance	-0.0112 (0.00609)	-0.0340 (0.0182)
Post	-0.454*** (0.103)	-1.227*** (0.307)
Days since issuance \times Post	-0.0247* (0.0104)	-0.0701* (0.0298)
Log original maturity	0.0278** (0.00882)	0.0813** (0.0251)
Log original maturity \times Post	0.0297* (0.0138)	0.0867* (0.0400)
OTR	-0.0126 (0.0220)	-0.0373 (0.0662)
OTR \times Post	-0.0285 (0.0382)	-0.0781 (0.113)
CTD	0.00891 (0.0133)	0.0273 (0.0398)
CTD \times Post	0.0624** (0.0200)	0.177** (0.0562)
D2D	0.159*** (0.00792)	0.511*** (0.0279)
D2D \times Post	-0.252*** (0.0169)	-0.804*** (0.0536)
Observations	502987	502987

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 1: Linear probability and probit model of what determines whether a trade occurs as a bilateral OTC trade. Regressors are the number of days since the issuance of the bond, the logarithm of the original maturity in days, dummies for the on-the-run and cheapest-to-deliver status of the bond, the fact whether the trade is between two dealers, and the logarithm of the transacted quantity and each is interacted with a dummy equal to one if the trade occurs after the introduction of MiFID II. Standard errors are clustered by bond.

To assess the economic magnitude of the changes in venue selection, we compute average marginal effects (AMEs) from the probit model. Because the specification allows the effects of bond characteristics to differ before and after MiFID II through interaction terms, we evaluate the AMEs separately under the pre- and post-reform regimes. Table 2 reports the difference between the post- and pre-reform AMEs (“post minus pre”). Thus, each coefficient reflects the change in the marginal effect of a given trade characteristic on the probability that a transaction is executed bilaterally OTC after the introduction of MiFID II.

While the differences are statistically significant, most are economically small. The largest change among the bond characteristics is observed for trades in cheapest-to-deliver (CTD) bonds: the marginal effect increases by approximately 6 percentage points after MiFID II. Overall, the relatively modest magnitudes suggest that changes in the composition of bonds across trading venues are unlikely to be the primary driver of the observed liquidity changes across venue types.

	Δ AME
Days since issuance	-0.0230 (0.0016)
Log original maturity	0.0283 (0.0026)
OTR	-0.0247 (0.0049)
CTD	0.0613 (0.0041)
D2D	-0.2519 (0.0027)

Table 2: ‘Post–Pre Differences in Average Marginal Effects from Probit Venue Selection Model. The table reports the difference between post- and pre-MiFID II average marginal effects from a probit regression of a bilateral OTC trading dummy on bond and trade characteristics. Each coefficient measures the change, in percentage points, in the marginal effect of the corresponding characteristic on the probability of OTC execution after the introduction of MiFID II. Marginal effects are computed separately under the pre- and post-reform regimes and averaged over the estimation sample. Standard errors are reported in parentheses.

6 Overall Market Liquidity

Next, we examine how overall market liquidity evolved around the introduction of MiFID II. To do so, we follow the approach of [Jankowitsch, Nashikkar, and Subrahmanyam \(2011\)](#) and proxy for market liquidity with a measure of daily price dispersion. For each bond, this measure captures at a daily frequency the variation in transaction prices around the daily median. Intuitively, higher dispersion can indicate higher direct transaction costs, dealer’s inventory risk, or investor search costs and thus lower market liquidity. We compute this measure as follows:

$$\text{PriceDispersion}_{b,t} = \sqrt{\frac{\sum_i Q_{i,b,t} (P_{i,b,t} - \tilde{P}_{b,t})^2}{\sum_i Q_{i,b,t}}}. \quad (1)$$

where $P_{i,b,t}$ and $Q_{i,b,t}$ are the price and quantity of trade i in bond b on day t , and $\tilde{P}_{b,t}$ is the median price of bond b on day t .

Figure 5 plots the time series of our price dispersion measure from January 2016 to December 2019, with a vertical line marking the MiFID II implementation date (January 3, 2018).

We observe a gradual downward trend throughout the sample. The improvement in liquidity appears to take place steadily in the years preceding the reform, while the period after January 2018 is characterized by stability at relatively low levels. There is no evidence of an abrupt structural break or immediate shift coinciding with the regulatory change. If anything, the market becomes calmer and less volatile in terms of liquidity after the reform, but not dramatically so. These aggregate patterns suggest that, at the market-wide level, MiFID II did not cause a sudden deterioration or improvement in overall liquidity.

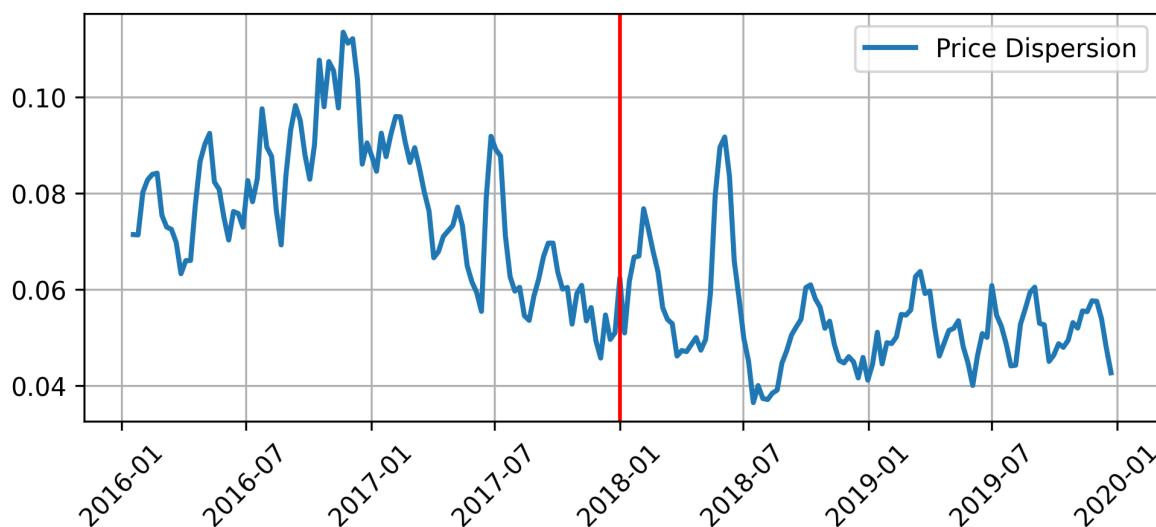


Figure 5: Price dispersion (4-week moving average) for German sovereign bonds across all trading venues. The vertical red line marks the introduction of MiFID II on January 1, 2018.

However, it is unlikely that the effect of MiFID II was homogeneous across all parts of the market. The reform introduced transparency obligations that varied substantially across trading venues, with the largest relative increase in disclosure affecting the most opaque channels. To explore this heterogeneity, we separate trades by venue category. We group execution venues into three broad segments: (i) bilateral over-the-counter trading, which combines trades reported as ‘XOFF’ (i.e., outside any venue) and systematic internaliser (SI) trades; (ii) RFQ platforms, which include MTFs, OTFs, and regulated markets (RMs); and (iii) the centralized limit order book segment, represented by the MTS interdealer platform. The latter is analyzed in detail in the next section. Here we focus on the comparison between bilateral OTC and RFQ trading.

Figure 6 shows price dispersion separately for bilateral OTC and RFQ trades. Before 2018, bilateral OTC trades consistently display higher dispersion than RFQ trades, implying that OTC transactions occurred at more scattered prices and hence lower liquidity. After the introduction of MiFID II, the two series converge and fluctuate around a similar level. This visual convergence suggests that liquidity in bilateral OTC trading improved relative to RFQ trading, consistent with stronger effects of the new transparency regime in the previously more opaque

segment of the market.

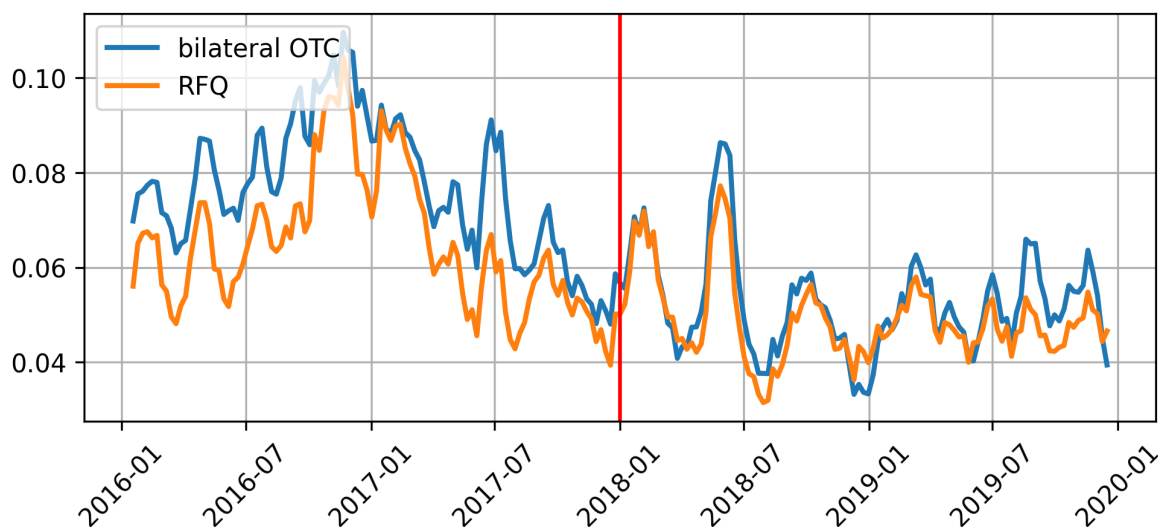


Figure 6: Volume weighted average price dispersion by venue category. The blue line shows price dispersion for bilateral OTC (XOFF and SI) trades; the orange line shows price dispersion for trades on RFQ platforms (MTFs, OTFs, and RMs). The measures are shown as 4-week moving averages. The vertical red line marks the introduction of MiFID II on January 1, 2018.

It is not trivial that this effect should arise as transparency on any venue should benefit all other venues simultaneously. In other words, if we think of mandated transparency as a treatment, MiFID II applied this treatment to all venues. However, the size of the treatment effect can be different across venues due to differences in their ex-ante characteristics. Differences in transparency that existed in the pre-period were smoothed when MiFID II took effect. Then either through composition effects or a direct effect on trading costs, the liquidity conditions on the two venue categories, bilateral OTC and RFQ, should a priori converge.

There are a number of theoretical reasons why bilateral OTC trades should be especially impacted by the transparency requirements. The first is related to information frictions. Since bilateral OTC trades do not happen on any platform, prior to MiFID II they were seen only by the transacting parties. Instead on an RFQ platform the platform provider would be able to observe these trades, and potentially even make public the data collected. Market participants may have a willingness to pay for the extra degree of anonymity that OTC trades grant and thus accept higher transaction costs than those they would have incurred on an RFQ platform. These considerations become irrelevant with the transparency requirements of MiFID II, thereby reducing the structural differences between the two transaction types.

The second reason is due to search and bargaining costs as described by [Duffie et al. \(2005\)](#). Search costs are typically higher for OTC trades as it is not as easy to get a large number of quotes from various dealers when contacting them individually, perhaps by phone, as when they

can simultaneously be contacted through a single platform. Higher search costs can explain lower liquidity for OTC trades. In principal, the requirements imposed by MiFID II should have lowered search costs, as under pre-trade transparency requirements, investment firms have to publish firm quotes for the instruments they trade. Even if these are only indicative, it reveals information to clients. This may have especially benefited OTC trades. A similar argument applies to bargaining costs. Having ex-ante information on quotes at which firms are willing to trade will level the playing field.

These reasons explain why the OTC venue should have been especially impacted by MiFID II. To prove this and to quantify the magnitude of the effect, we estimate a difference-in-differences regression comparing price dispersion between bilateral OTC and RFQ trades before and after MiFID II. Bilateral OTC trades form the treatment group, while RFQ trades serve as the control group. The interaction term between the post-reform indicator and the OTC dummy captures the relative change in liquidity for the more opaque trading category. Table 3 reports the results. The coefficient on the interaction term is negative and statistically significant, indicating that price dispersion declined more strongly for bilateral OTC trades than for RFQ trades after the reform. In other words, the liquidity gap between the two trading categories narrowed in the post-reform period. To check the robustness of this result we also run it only on the subset of bonds that are on-the-run and for bond frequently (on average every other day) traded via both types of trading protocols. This leads to more comparability between bonds and avoids concern that any result is driven by a change in the way more or less liquid bonds select into a venue category. The result for the OTR subset confirms the overall finding as shown in column 2 of Table 3.

	(1) Overall	(2) OTR Bonds	(3) Frequently traded
bilateral_OTC	0.00381*** (0.000874)	0.00488*** (0.000679)	0.00473*** (0.000975)
bilateral_OTC*Post	-0.00422*** (0.00113)	-0.00327** (0.00109)	-0.00561*** (0.00136)
Bond-Month FE	Yes	Yes	Yes
Observations	47228	4544	35422

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3: Difference-in-differences estimates of the effect of MiFID II on the price dispersion of bilateral OTC (treatment group) trades and RFQ (control group) trades. Column 1 shows the estimated coefficients for the complete set of bonds, column 2 only for the bonds that are on-the-run at the time of the trade, and column 3 for bonds that trade frequently (on average every other day) on both venues. Bond-Month fixed effects are included in both regressions. The post period begins with the introduction of MiFID II on January 1, 2018.

This finding supports the interpretation that MiFID II's transparency requirements improved relative liquidity in OTC trading, where disclosure obligations had the largest impact. With the

interaction coefficient in the difference-in-difference regression having a magnitude of around 0.4 bps, the effect is also economically sizable. By contrast, for the market as a whole, the average liquidity measures remain largely unchanged. The overall picture is therefore one of convergence rather than uniform improvement: MiFID II appears to have leveled liquidity conditions across trading venues without materially altering aggregate market performance.

It is important to emphasize that these results describe relative and gradual adjustments rather than discrete shocks. Both the time-series plots and the regression evidence indicate that market liquidity was evolving smoothly, and that any effect of MiFID II emerged progressively rather than instantaneously. The pre-2018 parallel trends between OTC and RFQ price dispersion suggest that using RFQ trades as a control group is appropriate. After the reform, the dispersion gap closes, pointing to a lasting shift in the relative functioning of these trading channels. In the next section, we turn to the MTS limit order book to examine in detail how transparency affected the behavior of interdealer liquidity providers and the benchmark segment of the Bund market.

7 Liquidity on MTS

We now turn to the MTS interdealer market to study how MiFID II affected liquidity in the central limit order book for German Bunds. A number of papers such as [Madhavan et al. \(2005\)](#) suggest that transparency can be harmful in limit order books and in interdealer markets. This makes it interesting to study how conditions on the European limit order book for sovereign bonds were impacted by the transparency requirements of MiFID II. MTS is a unique market in several ways in our setting. Firstly, limit order books are uncommon in bond markets. Secondly, MTS already operated under a high degree of pre- and post-trade transparency before the reform, as all participating dealers could observe one another's quotes and transactions. MiFID II nonetheless changed the information environment of the CLOB by extending visibility beyond its members to the broader market. Understanding how dealers adjusted their quoting and trading behavior in response provides direct evidence on how transparency reshaped the functioning of this benchmark venue.

The Bund market on the MTS central limit order book has around 40 members, many of which are also primary dealers. The MTS members play a central role in the entire Bund market. They are involved in more than 80% of all trades and in 85% of the trade volume. A large share of their trades occurs over the counter but they also transact on around 87% of all other venues. MTS imposes rules on its members. Market makers for a specific instrument have to provide quotes for this instrument for at least 50% of trading hours. Double sided quotes cannot differ too strongly in the quantity quoted on each side. Since January 2018, quotes must also comply with a maximum spread of one percentage point. Previously the size of the spread had not been regulated. Coincidentally, this change occurred at the same time as MiFID II.

Most importantly, however, MiFID II changed the visibility of quotes and transactions. Since the MTS CLOB is an interdealer venue, trades and quotes had only been visible to other dealers. With the introduction of reporting requirements for pre- and post-trade transparency, the transactions and the quotes became visible to the entire market. This had a profound effect on the market.

The first striking result is that while spreads in other venues decreased, MiFID II led to an increase in median best bid-ask spreads on the CLOB. Figure 7 shows the 4-week rolling average of daily cross-sectional median of the best bid-ask spread across all Bund securities traded on MTS alongside price dispersion measures for OTC and RFQ trades. Given that these are two different measures, their level is not entirely comparable, however, it is clearly visible that their trends go in different directions. After January 2018, quoted spreads widen noticeably, making the market less liquid and indicating that dealers became more cautious in posting competitive quotes once their trading activity became publicly observable.

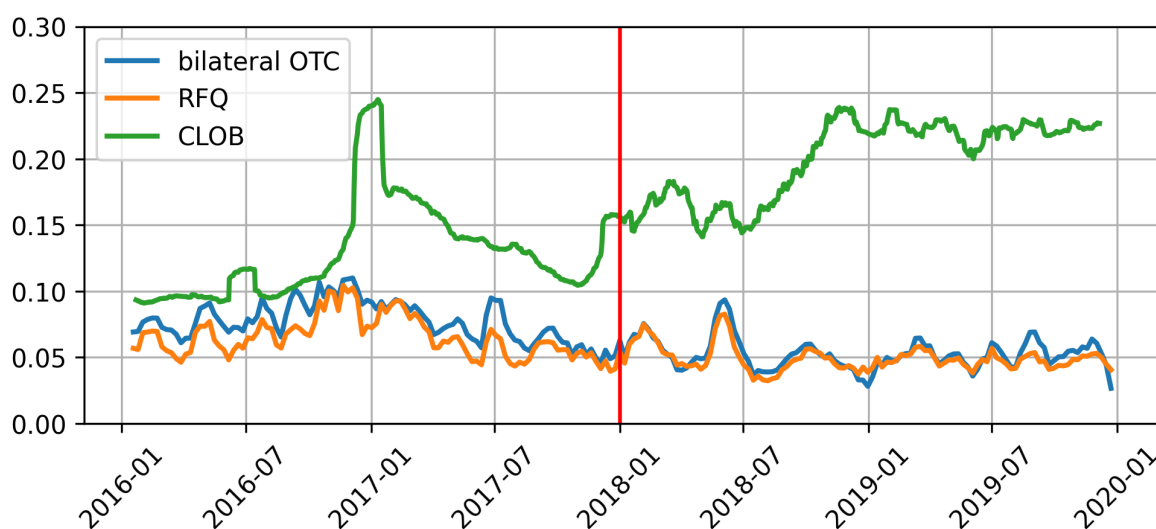


Figure 7: Median best bid-ask spreads on the MTS central limit order book (green) and price dispersion for bilateral OTC trades (blue) and RFQ trades (orange). All three time series are shown as 4-week moving averages. The vertical red line marks the introduction of MiFID II on January 1, 2018.

Another visible pattern is the disappearance of end-of-year spikes (as visible at the end of 2016 and 2017). This is due to the change in MTS market rules that mandated a maximum spread of one percentage point and that coincided in its timing with that of MiFID II.

This result is in line with findings of [Madhavan et al. \(2005\)](#) on increases of transparency in a Toronto Stock Exchange central limit order book. The paper also finds that liquidity providers respond to increased transparency by quoting more cautiously, as they are reluctant to provide free options to market order traders. However, an important difference in the case of MTS is

that transparency did not provide additional information to anybody able to immediately take advantage of it by issuing a market order. Only MTS members can send market orders and these already had full information prior to MiFID II. Hence, simply the fact that quotes were publicly disseminated sufficed to make dealers quote more cautiously.

Second, MiFID II led to a decrease in the volatility of the mid price. Figure 8 reports the average daily volatility of the MTS CLOB midprice across all bonds in our sample. To make sure that our conclusions are not confounded by the effect of the rule change on MTS that introduced a maximum quoted spread at the same time MiFID II was introduced, we remove any mid prices resulting from a spread higher than one percentage point. However, a similar pattern is visible when including all mid prices.

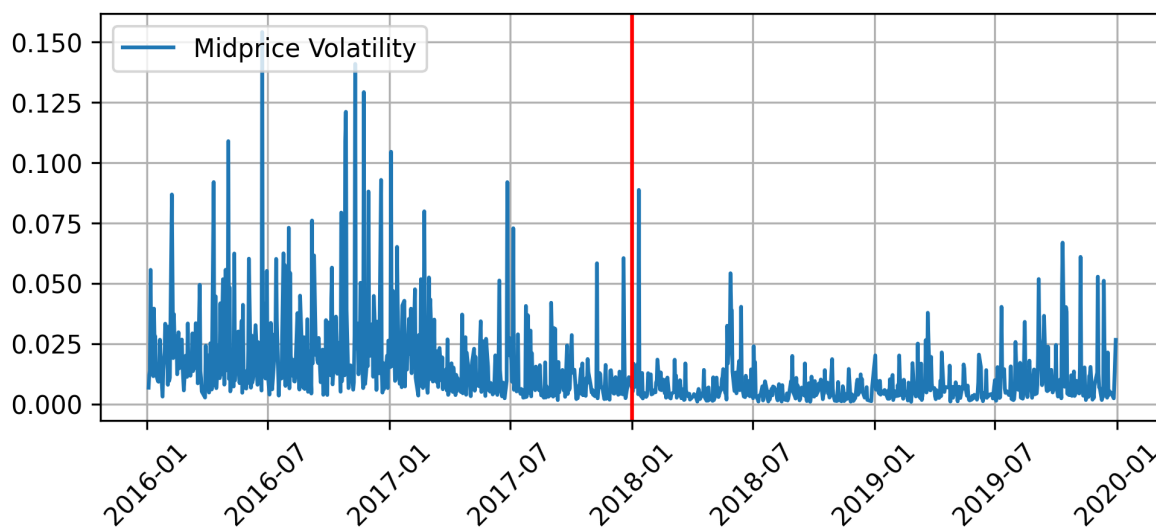


Figure 8: Daily average midprice volatility on the MTS CLOB across all German sovereign bonds. Midprices resulting from a spread larger than 1 pp are excluded to avoid the result being driven by a contemporaneous MTS rule change. The vertical red line marks the introduction of MiFID II on January 1, 2018.

We observe a stark decline in volatility towards and after the reform. This indicates that the increase in bid-ask spreads documented above is not driven by higher market volatility and uncertainty. Instead the finding is a reflection in dealers updating their spreads less aggressively following MiFID II.

For robustness, we also compute the median mid price volatility and the return volatility. The latter is calculated as the standard deviation of intraday (5-minute) returns across all bonds. As can be seen in Figures A3 and A4 of the appendix, both measures exhibit the same pattern of decreasing volatility. The fact that the time series of median volatility exhibits the same structural break around the introduction of MiFID II indicates that the effect is not due to outliers that strongly influence the mean. This is important to rule out as the rule change enforcing a maximum spread was enacted at the same time as MiFID II. This impacted price outliers and

could potentially play a role in the average mid price volatility. However, by looking at the median mid price and removing outlier spreads we can rule out this explanation. Similarly, looking at returns allows us to have a comparable measure across bonds that we can aggregate to a single time series. We thereby alleviate concerns that our result is driven by our method of aggregation.

Third, a growing share of bilateral over-the-counter or RFQ trades occur at prices outside the contemporaneous bid–ask spread on the MTS CLOB, as shown in Figure 9. This pattern emerges despite the widening of quoted spreads shown in Figure 7 and in spite of our result from Section 6 that overall market liquidity did not deteriorate.

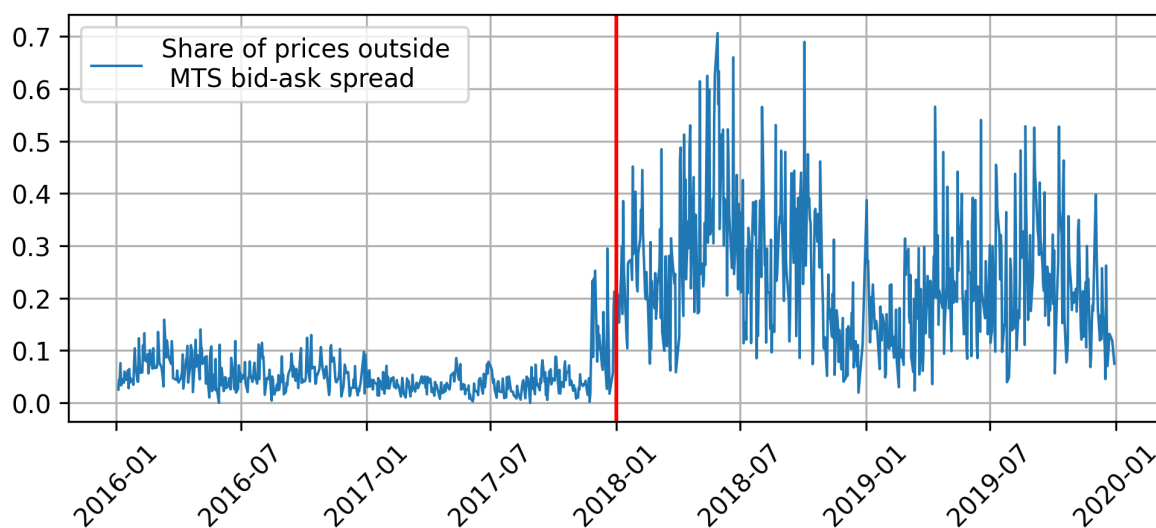


Figure 9: Daily share of bilateral OTC and RFQ trades executed at a price outside of the contemporaneous best bid–ask spread on the MTS CLOB. The vertical red line marks the introduction of MiFID II on January 1, 2018.

The jump in the share of trades executed outside the best bid–ask spread actually occurs about a month before the introduction of MiFID II. It is not clear whether this is an anticipation effect of the reform about to be implemented, or whether the result in this period is simply confounded with end-of-year market turbulence. The latter, however, seems unlikely as there is no similar pattern at the end of 2016 or the post-reform years. In any case the effect persists over the entire rest of the sample, ruling out any temporary phenomena as possible explanations. We are also not aware of any other non-MiFID II related events occurring in November 2017 that could have caused the effect seen in Figure 9.

Fourth, when we measure transaction costs at a much higher frequency, i.e., instead of taking the closing mid price of the previous day as a reference price we take a mid price available at most 5 minutes before the trade, transaction costs exhibit a dramatic 3-fold increase around the time of the introduction of MiFID II. Again, the actual effect occurs about a month before MiFID II which could be due to anticipation or end-of-year effects. This finding seems contra-

dictory to our result from Section 6 that overall market liquidity did not decrease. Since MTS was already transparent prior to MiFID II, one might have expected the platform to benefit from the additional information released by other venues. Dealers could, in principle, use the new public data to refine their pricing and reduce bid–ask spreads. The decline in mid price volatility shown in Figure 8 could even be interpreted as evidence of greater price consensus. Yet this interpretation is contradicted by the observed increase in quoted spreads and trading costs.

A second apparent contradiction arises when considering the share of trades executed outside the MTS spread. If MTS became less liquid, one might expect other venues to deteriorate even more strongly in order to explain this rise. However, the analysis in the previous section shows that OTC and RFQ liquidity remained stable or improved slightly, which rules out this explanation.

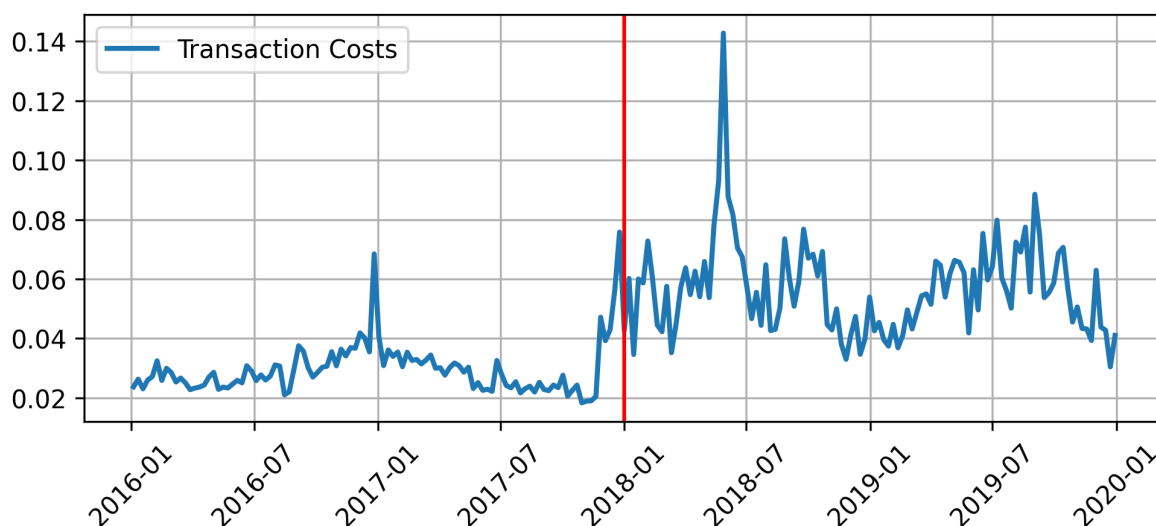


Figure 10: Volume-weighted weekly average high frequency transaction costs of bilateral OTC and RFQ trades. High frequency transaction costs are computed as the absolute difference between the transaction price and the mid price of the same bond at the time of the transaction or at most 5-minutes prior. The vertical red line marks the introduction of MiFID II on January 1, 2018.

The reconciliation lies in understanding precisely how MiFID II altered the strategic environment on the CLOB. Before 2018, all quotes and trades were visible to MTS members but not to the wider market. Dealers could therefore trade with one another without their clients observing prevailing interdealer prices. After MiFID II, this separation disappeared: trade and quote information from MTS became publicly available. Dealers’ quoting decisions were now visible to competitors and clients alike, increasing the informational cost of posting aggressive quotes. To manage this risk, dealers began quoting more conservatively, widening spreads and reducing the frequency of quote updates. The lower mid price volatility reflects this more cautious behavior—prices changed less often because dealers adjusted their quotes less aggressively—but

the reduced dynamism in the order book weakened MTS’s price discovery function. As a result, quotes on the CLOB became less representative of overall market conditions, and prices on other venues more frequently fell outside the displayed MTS spread even though their own liquidity did not deteriorate.

In this sense, MiFID II did not simply add transparency to the CLOB; it changed the nature of the information revealed and to whom it was revealed. The platform shifted from being a semi-private interdealer benchmark to a quasi-public quoting venue, where displayed prices carried new signaling costs for dealers. The rise in spreads and transaction costs, combined with lower price volatility, thus reflects an endogenous adjustment of dealer behavior to a broader audience and a new equilibrium in which liquidity provision on MTS became more limited. The next section explores the consequences of this shift for price discovery and the informational role of the Bund market’s benchmark platform.

8 Price Discovery

Transactions move prices when they convey information. If dealers become more cautious in their quoting after MiFID II, less private information should be revealed through their trades, and prices on the interdealer CLOB should adjust less strongly to order flow. In this case, changes in the MTS mid price would reflect a smaller share of the information embedded in market-wide trading activity. To test this idea, we examine how the relationship between order flow and short-term mid price changes evolved around the implementation of MiFID II.

We estimate regressions of the form

$$r_{i,t} = \alpha + \beta OF_{i,t} + \varepsilon_{i,t}, \tag{2}$$

where $r_{i,t}$ denotes the log return of the MTS mid price for bond i over a five- or ten-minute interval (depending on data availability), and $OF_{i,t}$ is the corresponding order flow in that instrument aggregated across all trading venues and OTC trades. Following standard practice in a Glosten–Milgrom type framework, we measure order flow as a simple buy–sell indicator: each buy transaction contributes +1, each sell contributes −1, and we sum over all trades within the interval. The coefficient β captures how strongly prices respond to net buying pressure. A positive β implies that excess demand raises prices—evidence that order flow contains information that is incorporated into prices.

The overall estimated correlation between returns and order flow is small but positive, meaning that prices tend to move in the direction of net buying or selling pressure. This is expected: price formation and trading activity are jointly determined, and some of the variation in order flow is likely to reflect reactions to recent price movements rather than independent informa-

tion. While this simultaneity limits the interpretation of β as a structural measure of information content, it remains informative for our purpose because any systematic change in β over time indicates a shift in how strongly trades affect prices.

When we regress the log return in the MTS mid price on the order flow but allow the coefficient of the order flow to differ before and after MiFID II by including an interaction term with a post dummy, we find that returns correlate very positively with order flow in the pre-period but that this reverses in the post period. These results are reported in Table 4. We first run the regression for the entire sample and then only for D2D and D2C trades separately. All three cases confirm the same finding: While the correlation is positive prior to MiFID II, it turns negative afterwards. The result is largest in the two subsamples than for the overall sample of trades as dealers naturally mainly incorporate information from their own trades into the their quotes. Overall this result suggests a marked change in the relation between order flow and price adjustments.

	(1)	(2)	(3)
	All trades	D2C	D2D
Order Flow	0.350*** (0.0468)	0.413*** (0.0582)	0.631*** (0.106)
Order Flow \times Post	-0.447*** (0.0609)	-0.536*** (0.0656)	-0.765*** (0.137)
Lagged return	-0.159 (0.0963)	-0.159 (0.0960)	-0.160 (0.0960)
Log time-to-maturity	-0.329* (0.149)	-0.294* (0.140)	-0.275* (0.135)
Bond FE	Yes	Yes	Yes
Observations	37316	37316	37316

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: Linear regression of mid price returns on order flow from all trades (column 1), only D2C trades (column 2), and only D2D trades (column 3). The dependent variable is the log return of the MTS mid price over a 5- or 10-minute interval. Order flow is defined as the net number of buy minus sell transactions in the same bond and interval, aggregated across trades on all trading venues and OTC trades. We include a regressor that interacts order flow with a dummy variable equal to one after the introduction of MiFID II. Other explanatory variables in all four regressions are the lagged return in the mid price and the log of the time to maturity of the bond at the time of the trade. The regression contains bond fixed effects and standard errors are clustered by bond.

The negative post-reform coefficient does not imply that order flow became completely uninformative, but it does show that the information transmitted through trading activity is now

reflected less directly in MTS prices. The change is consistent with dealers quoting and trading more cautiously once their behavior became visible to a wider market audience. Before MiFID II, dealers' trades and quotes on MTS were observable only to other members of the interdealer network, allowing them to incorporate private information into their activity without revealing it to clients. After the reform, trade data became public, and quoting or trading aggressively could signal dealers' information or inventory positions to the entire market. Dealers responded by moderating their trading behavior and adjusting quotes less frequently, which reduced the immediate informational content of order flow for prices.

In this interpretation, MiFID II weakened the link between trading activity and price formation on the CLOB. Prices became smoother and less reactive to short-term order imbalances, mirroring the decline in mid price volatility documented in the previous section. This is consistent with an overall shift from an interdealer environment characterized by active information exchange to a more cautious, public market where transparency imposed higher costs on revealing information through trades. The evidence therefore supports the view that MiFID II not only altered liquidity on the MTS central limit order book but also changed the dynamics of price discovery, reducing the extent to which interdealer trading contributed to information aggregation in the Bund market.

9 Conclusion

This paper studies how the introduction of MiFID II's pre- and post-trade transparency requirements reshaped liquidity provision and price formation in the German Bund market. Exploiting the coexistence of highly transparent, semi-transparent, and previously opaque trading venues, the analysis shows that the reform had markedly heterogeneous effects across market segments. At the aggregate level, market-wide liquidity measures remained broadly stable over the reform period. Beneath this surface, however, transparency fundamentally altered the relative functioning of different trading venues and, in particular, the role of the interdealer central limit order book.

The first key finding is that liquidity improved relative to RFQ trading in the most opaque segment of the market: bilateral OTC transactions. Price dispersion declined more strongly for OTC trades than for RFQ trades after the introduction of MiFID II, leading to a convergence of liquidity conditions across these venue types. This result is consistent with the idea that transparency has its strongest effects where information frictions, search costs, and bargaining power asymmetries were largest ex ante. By mandating public disclosure of transaction information, MiFID II reduced the informational advantage previously associated with bilateral OTC trading and lowered the implicit cost of execution in that segment. Importantly, this improvement reflects a relative rebalancing rather than a uniform liquidity gain across the market, as overall liquidity measures show no sharp structural break around the reform date.

In contrast, the paper documents a pronounced deterioration in liquidity and price discovery on the MTS interdealer central limit order book. After quotes and trades became publicly observable beyond the dealer community, bid–ask spreads widened, transaction costs measured relative to high-frequency reference prices increased sharply, and a growing share of trades executed elsewhere occurred outside the contemporaneous MTS spread. At the same time, mid price volatility declined, indicating that the increase in spreads was not driven by higher uncertainty but by more cautious quoting behavior. Dealers adjusted their activity by updating quotes less aggressively and revealing less information through their trades. As a result, the MTS order book became less informative about prevailing market conditions, and its role as a benchmark venue for price formation weakened.

These changes are mirrored in the analysis of price discovery. Before MiFID II, short-horizon movements in MTS mid prices were positively related to aggregate order flow across venues, indicating that interdealer trading on MTS played an important role in aggregating information. After the reform, this relationship weakened substantially and even reversed in sign, especially when focusing on dealer-to-client order flow involving MTS-active dealers. This finding is consistent with a shift in dealers’ incentives: once interdealer activity became visible to the broader market, revealing information through aggressive quoting or trading carried higher strategic costs. Transparency therefore reduced the extent to which private information was incorporated into prices via the interdealer market, dampening the price discovery function of the CLOB even as overall market liquidity remained intact.

Taken together, the results highlight a fundamental trade-off inherent in transparency regulation. While MiFID II succeeded in improving relative liquidity in previously opaque market segments and in harmonizing conditions across venues, it simultaneously undermined liquidity provision and information aggregation in a market segment where these functions depended on a semi-private interdealer environment. The German Bund market illustrates that greater transparency does not uniformly enhance market quality: when liquidity provision relies on dealers’ willingness to expose quotes and positions within a restricted network, extending transparency to a broader audience can discourage competitive quoting and weaken benchmark price formation.

These findings are directly relevant for current and future revisions of the MiFID II transparency framework. Recent reforms, including the introduction of a consolidated tape and the exemption of RFQ platforms from pre-trade transparency requirements, aim to improve the usability of reported data and to better align transparency obligations with market structure. The evidence in this paper suggests that such differentiation is crucial. Transparency that is beneficial in dealer-to-client or bilateral settings may be harmful in interdealer limit order books that serve as informational backbones for the market. Policymakers should therefore carefully consider not only the level of transparency but also its distribution across venue types and

participant groups. Designing transparency regimes that preserve the incentives for interdealer liquidity provision and price discovery, while still improving access to information in opaque segments, is essential for maintaining the smooth functioning of sovereign bond markets.

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Appendix A Robustness

A.1 MTS Liquidity

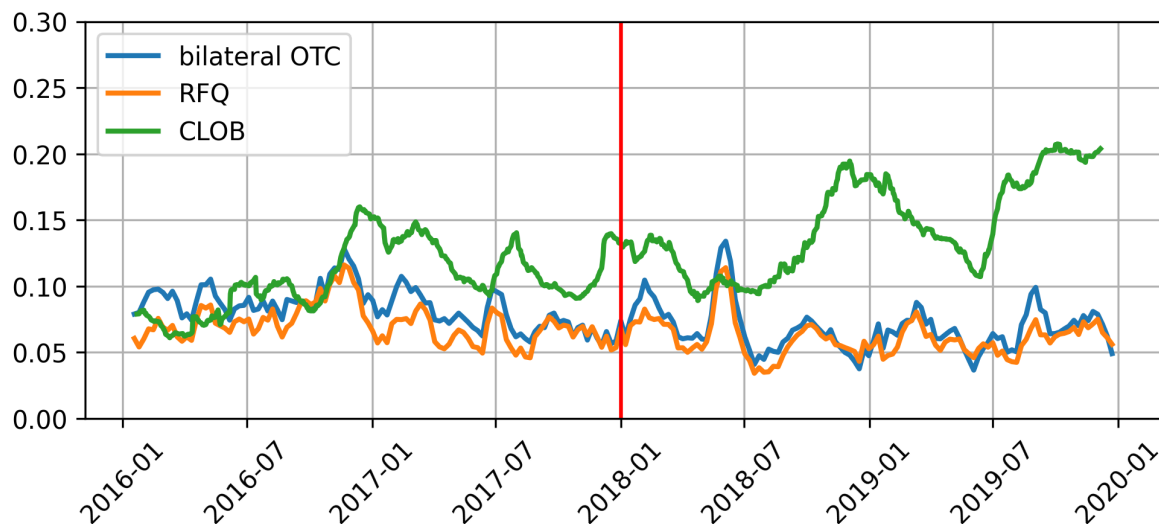


Figure A1: Median best bid–ask spreads on the MTS central limit order book (green) and price dispersion for bilateral OTC trades (blue) and RFQ trades (orange) for OTR bonds. All three time series are shown as 4-week moving averages. The vertical red line marks the introduction of MiFID II on January 1, 2018.

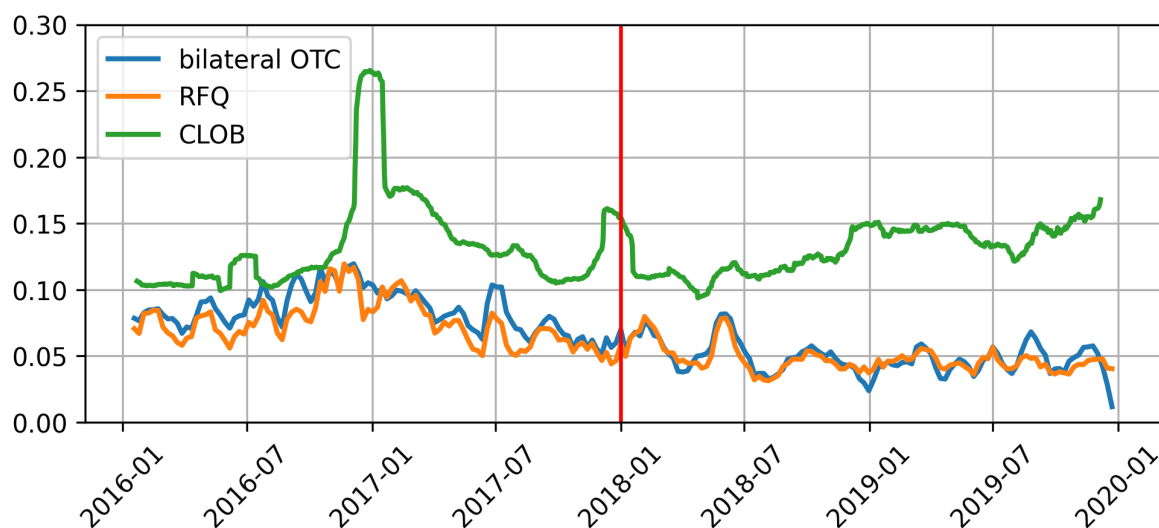


Figure A2: Median best bid–ask spreads on the MTS central limit order book (green) and price dispersion for bilateral OTC trades (blue) and RFQ trades (orange) for bonds that trade frequently (every other day on average on RFQ platforms and via bilateral OTC). All three time series are shown as 4-week moving averages. The vertical red line marks the introduction of MiFID II on January 1, 2018.

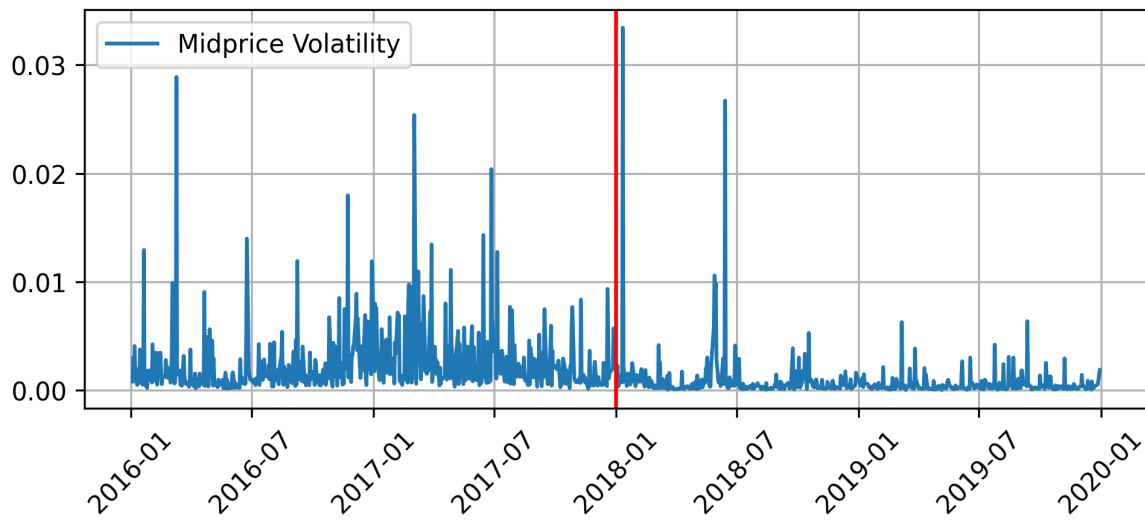


Figure A3: Daily median midprice volatility on the MTS CLOB across all German sovereign bonds. The vertical red line marks the introduction of MiFID II on January 1, 2018.

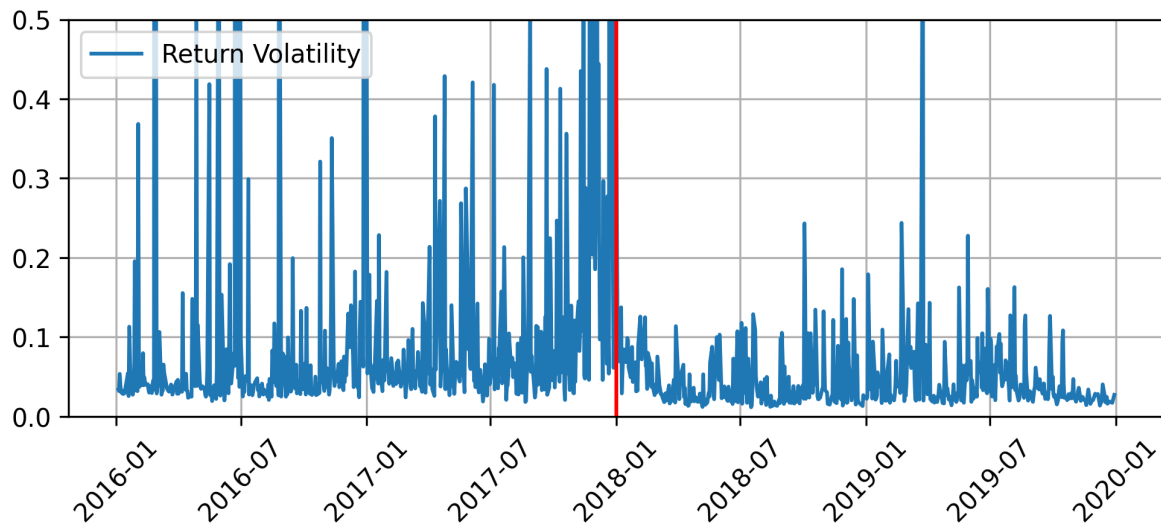


Figure A4: Volatility of returns in MTS midprices for all German sovereign bonds in our sample. Returns are computed as the percentage change between two consecutive midprices in the same ISIN. Usually, due to our sampling procedure, we observe a midprice every five minutes. The vertical red line marks the introduction of MiFID II on January 1, 2018.

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